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(71) Applicant: E. I. DU PONT DE NEMOURS AND COMPANY [US/US]; 1007 Market Street, Wilmington, DE 19898 (US).

(72) Inventor: DUCKWALL, Louis, Ralph ; 2816 Fawkes Drive, Wilmington, DE 19808 (US).

(74) Agents: SHOLD, David, M. et al.; E. I. du Pont de Nemours and Company, Legal Department, 1007 Market Street, Wilmington, DE 19898 (US).

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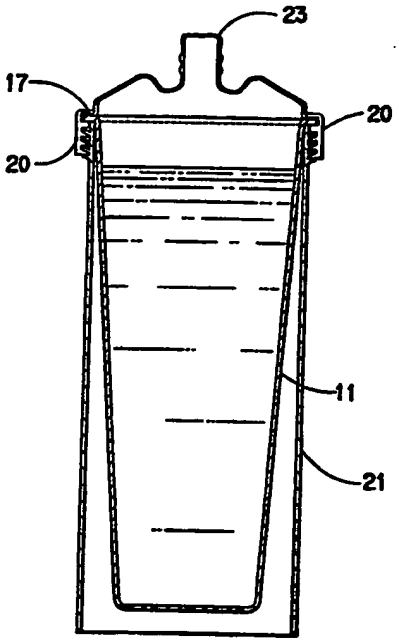
(54) Title: DISPOSABLE PRE-STERILIZED FEEDING PACKAGE

(57) Abstract

A disposable container (11) suitable for use as an insert in a dispensing bottle comprises a progressively collapsible body portion and a rigid annular flange (17) at the top of the body portion extending radially outward therefrom, said body portion having a wall (13) comprising at least one structural layer (27, 29) and preferably at least one barrier layer (31) comprising an ethylene vinyl alcohol copolymer.



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TITLE

DISPOSABLE PRE-STERILIZED FEEDING PACKAGE

BACKGROUND OF THE INVENTION

This invention relates to a disposable feeding package particularly suited for use as a disposable cartridge for dispensing of liquids from a baby bottle.

Baby nursing bottles which use disposable inserts for containing liquids such as milk or formula are well known and widely used. Use of such inserts is advantageous because they can eliminate much of the need for sterilization of bottles and other time-consuming tasks related to feeding milk or formula to infants. Use of collapsible inserts can provide for ease of removal of the contents, e.g. by the sucking action of the infant. Use of previously filled, sterilized inserts containing preformulated milk or formula presents an added convenience for traveling and other times when preparation of food or formula is inconvenient. However, as currently known, such systems have certain disadvantages. For example, some of the well-known inserts require a fair amount of work to in opening, inserting, and filling. In addition, certain insert structures made of thin films may not be sufficiently impermeable to oxygen or other contamination to permit long term storage of sealed, sterile foodstuffs. Furthermore, high flexibility of the insert is desirable for liquids, although not for more viscous foods. Thus inserts having thicker walls may provide protection against oxygen permeation, but do not have the desired collapsibility for dispensing liquids. All known examples of such insert systems are economically unsound for one reason or another, are not easily manufactured, or cannot achieve the balance among rigidity, flexibility, and

collapsibility required for a prefilled, sterilized insert for storage and delivery of either food or milk.

U.S. Patent 2,885,104 discloses a disposable cartridge adapted to be removably installed in a dispensing bottle, capable of holding the solvent and solute of a predetermined solution separated from one another until it is desired to prepare the solution. The cartridge comprises an expandable bag formed from thin, pliable sheet material in the form of a sleeve. The sleeve is secured to a support ring having a T-shaped cross section and an annular flange. (See Fig. 2 of that reference.)

U.S. Patent 3,075,666, discloses a nursing bottle including a tubular holder having an open end adapted to be closed by a nipple, and a disposable flexible open-ended container having an upper marginal portion folded outwardly and downwardly over the outside surface of the end of the holder.

U.S. Patent 4,706,827 discloses a nursing container employing a rigid outer sleeve or holder and a flexible inner container. The inner container may be of multiple layer construction, including an oxygen barrier layer. The inner pouch is securely mounted by a rigid plastic disc disposed between the pouch and the nipple assembly. The pouch is sealed to the disc, e.g. by heat sealing or by use of an adhesive.

European patent application 0 305 146 discloses blends of ethylene vinyl alcohol copolymer with a minor amount of amorphous polyamide for use as a barrier layer in thermoformed multilayer containers. This modified EVOH composition can be used in thermoformed multilayer structures without rupturing and while maintaining the excellent gas barrier properties of EVOH.

SUMMARY OF THE INVENTION

The present invention provides a disposable container suitable for use as an empty or prefilled, sterilized insert in a dispensing bottle, comprising a progressively collapsible body portion and a rigid annular flange at the top of the body portion extending radially outward therefrom, said body portion having a wall comprising at least one polymeric structural layer. The invention further provides a container having at least one barrier layer comprising an ethylene vinyl alcohol copolymer.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a container of the present invention.

Figure 2 is a partial cross sectional view showing the detailed layered structure of a portion of a container of one embodiment of the present invention.

Figure 3 is a cross-sectional view of a container of the present invention inserted in a baby nursing bottle.

DETAILED DESCRIPTION OF THE INVENTION

The present invention comprises a multilayer container suitable for use as an insert in e.g. a baby bottle. Figure 1 shows one embodiment of such a container, 11, from a side view. The body of the container comprises a substantially cylindrical wall, 13, preferably slightly tapered, and a bottom, 15, together forming a deep cup-like shape. At the top of the container is a flange, 17, which extends around the circumference of the wall and extends a short distance outward from the wall. The flange and the

body of the container are preferably integrally formed of the same material, as shown in more detail in Figure 2, or they may alternatively be formed separately and attached by any of a variety of known mechanical or adhesive means, to form an impermeable seal therebetween.

The body portion may comprise more or less separately distinguishable wall and bottom portions, as shown in the Figure 1, or it may comprise a single pouch-like structure without a separately distinguishable bottom. The body portion of the container is progressively collapsible under suction such as that exerted by the nursing action of an infant. The degree of collapsibility can be readily varied as required to optimize the container for delivery of low viscosity or high viscosity food. The bottom of the body portion may be a simple seam closing the bottom of the container, or it may be a more complex shape if the container is in the form of e.g. a gussetted bag. Preferably, however, the body of the container exhibits sufficient rigidity to be self-supporting in an open and upright position. The body portion is preferably adapted to fit within an outer dispenser. It is preferably made in one piece with no seams, to eliminate risk of contamination.

The flange portion of the container is located at the upper end of the body portion and extends radially outwards a short distance from the wall. The flange is substantially planar and rigid and is adapted to accept a lid, shown as 19 in Figure 1, in sealing relationship across the top surface thereof, thereby closing off the top of the container once it is filled. The lid can be a conventional

peelable lid, which can be made of metal foil, impermeable plastic, foil-plastic laminate, and the like. The lid is preferably a heat sealable, peelable, foil or plastic based impermeable lid, heat sealed to the flange using a conventional adhesive so that it can be peeled away from the flange to facilitate removal of the contents of the container. The lid may be provided with a tab, 25, to aid in removal. The lid can be applied to the flange either before or after the container itself is trimmed away from the sheeting stock from which it is preferably formed. Alternatively, the lid can be mechanically attached to the flange or permanently sealed adhesively after the container is filled, provided that the lid is puncturable or otherwise openable so as to permit removal of the contents.

The flange of the container is preferably trimmed to a size suitable to be held within a dispenser, thereby securing the container within the dispenser. A typical dispenser suitable for holding the container is an infant nurser or baby bottle. A container of the present invention (detachable cover removed) is shown in Figure 3 in cross section inserted within an infant nurser of well-known structure. The dispenser itself comprises a hollow, rigid, substantially cylindrical holder, and a dispensing top, 23, such as a nipple formed of rubber, plastic, or other suitable material. The annular flange, 17, of the container fits across the upper end of the cylindrical holder and below and in contacting relationship with the dispensing top. The dispensing top, container, and cylindrical holder are held together by appropriate mechanical means, such as a threaded hold-down nut, 20, which interlocks with matching threads on the cylindrical holder. The

assembled structure permits dispensing of the contents of the container, e.g., infant formula, through the dispensing means.

Although the container of the present invention is particularly suitable for use in a baby bottle, as described above, it can also be used in a variety of other dispensers and for dispensing a variety of liquid and semiliquid foods. The container may be used, for example, as in insert for portable beverage containers used for athletic events, for containers used for feeding elderly or disabled persons, or for liquid snacks and drinks for children and adults, and so on. For such containers the dispensing top would not normally be a nipple, but would be some suitable dispensing means such as a tube or a spout. Examples of semiliquid foods that can be dispensed by the present invention, using an appropriate dispensing means, include apple sauce, soups, pureed baby foods, and other finely ground semisolid meats, vegetables, fruits, or cereals.

The container of the present invention is progressively and selectively collapsible under suction, the collapse beginning at the bottom. This feature is particularly important (a) when liquid foods such as milk are being dispensed, so as to permit substantially complete evacuation of the container and reduced intake of air, compared to what would be expected with a more rigid container, and (b) when more viscous foods, such as pureed baby food, are dispensed, so as to prevent trapping food in the distant portion of the container due to initial collapse of the container in the wrong place (near the top). A container with progressive selective collapse beginning at the bottom can be obtained by making the walls (and bottom, if any) thinner at the bottom than

at the top, and prepared from a material having at least a minimal degree of rigidity, as distinguished from a limp plastic bag. Such a configuration can be obtained by solid phase pressure forming (thermoforming) the container from an appropriate plastic multilayer stock (described in more detail below). It has been found suitable to prepare a container with wall thickness of about 50 to about 250 micrometers at the bottom or distal portion and about 300 to about 1000 micrometers at the top. It is particularly desirable to prepare containers with walls which vary in thickness from about 100 to 150 micrometers at the bottom to about 400 to 600 micrometers at the top. Such a gradation in thickness is obtainable without any special processing techniques when a sheet of 1700 micrometer stock is thermoformed into a container about 40-50 mm across and about 140 mm deep.

In order to prepare a commercially useful container, it is preferable that the container be substantially impermeable to oxygen, gasses, and contaminants. Such a preferred container can permit room temperature storage of sterile food or beverage in the sealed, sterile containers for a long time, e.g. a year, without spoilage due to oxygen degradation of fatty foods. A suitable material of construction for such a container is a laminar structure, e.g. a coextrusion, of at least one polymeric structural layer and at least one polymeric barrier layer. The structural layer provides support, protection, and a degree of rigidity for the normally thinner barrier layer. Referring to Figure 2, two structural layers, 27 and 29, are preferably used, one on either side of the barrier layer 31. Adhesive layers 33 and 35 may also be employed. Suitable

polymers for use as structural layers include polypropylene, polystyrene, polyester, polyethylene, and the like; thermoplastic materials which can be thermoformed at or below the thermoforming temperature of the barrier layer.

The barrier layer, which is preferably present, is a polymeric material which exhibits good barrier properties, particularly to oxygen. Preferably the barrier layer comprises about 5 to about 50% of the thickness of the container wall. The barrier layer itself preferably consists essentially of about 50 to 100 percent ethylene vinyl alcohol copolymer and up to about 50 percent of an amorphous polyamide component. Such barrier layers are described in more detail in European Patent Application 0 305 146, published March 1, 1989, the disclosure of which is incorporated herein by reference.

The ethylene vinyl alcohol copolymer contains about 20 to about 60 mole percent copolymerized ethylene, and is at least about 90% saponified, preferably at least about 95%, and most preferably at least about 99% saponified. Such polymers can be prepared by well known processes of copolymerization of ethylene and vinyl acetate, followed by saponification.

The amorphous polyamide component comprises up to about 50% by weight of the barrier layer. Within these limits, good barrier properties are obtained. When more than about 50% of the amorphous polyamide component is used the oxygen barrier properties of the blend are degraded. The presence of at least a small amount of amorphous polyamide component is desirable in order to provide for improved ease of thermoforming of the barrier layer.

This polyamide component is preferably about 10 to about 35%, and most preferably about 15 to about 30% of the barrier layer. Of course, small amounts of other material such as other polymers, processing aids, antioxidants, fillers, pigments, etc. may be included in the blend without destroying the essence of this invention.

The amorphous polyamide component can be an amorphous polyamide, or it can be a blend of amorphous polyamide containing a certain amount of semicrystalline nylon. Amorphous polyamides include those amorphous polymers prepared from the following diamines: hexamethylenediamine, 2-methylpentamethylenediamine, 2,2,4-trimethylhexamethylenediamine, 2,4,4-trimethylhexamethylenediamine, bis(4-aminocyclohexyl)methane, 2,2-bis(4-aminocyclohexyl)isopropylidine, 1,4-diaminocyclohexane, 1,3-diaminocyclohexane, meta-xylylenediamine, 1,5-diaminopentane, 1,4-diaminobutane, 1,3-diaminopropane, 2-ethyldiaminobutane, 1,4-diaminomethylcyclohexane, p-xylylenediamine, m-phenylenediamine, p-phenylenediamine, and alkyl substituted m-phenylenediamine and p-phenylenediamine.

Examples of polyamides that can be used include those amorphous polymers prepared from the following dicarboxylic acids: isophthalic acid, terephthalic acid, alkyl substituted iso- and terephthalic acid, adipic acid, sebacic acid, butane dicarboxylic acid, and the like.

Polyamides prepared from aliphatic diamines with aliphatic diacids are the traditional semicrystalline nylons (also referred to as crystalline nylons) and are not amorphous polyamides. Polyamides prepared from aromatic diamines and aromatic diacids are also known. However, certain of

these all-aromatic polyamides are known to be intractable under ordinary melt processing conditions, and thus are not normally suitable. Thus the preferred amorphous polyamides are those in which either the diamine or the diacid moiety is aromatic, and the other moiety is aliphatic. The aliphatic groups of these polyamides preferably contain 4-8 carbon atoms in a chain or an aliphatic cyclic ring system having up to 15 carbon atoms. The aromatic groups of the polyamides preferably have mono or bicyclic aromatic rings which may contain aliphatic substituents of up to about 6 carbon atoms.

However, not all of these aromatic/aliphatic combinations will necessarily provide suitable amorphous polyamides. For example, specifically metaxylylenediamine adipamide is not generally suitable for this invention. This polymer readily crystallizes under heating conditions typical for thermoforming operations, and also crystallizes upon orienting. This illustrates the fact that it is important to determine that a particular polyamide is in fact amorphous, and not to rely solely on the chemical structure of the polymer. This determination can easily be made by differential scanning calorimetry.

Specific examples of amorphous polyamides which are suitable for this invention include: hexamethylenediamine isophthalamide, hexamethylene-diamine isophthalamide/terephthalamide terpolymer, having iso/terephthalic moiety ratios of 100/0 to 60/40, mixtures of of 2,2,4- and 2,4,4-trimethylhexa-methylenediamine terephthalamide, copolymers of hexamethylene diamine and 2-methylpentamethylenediame with iso- or terephthalic acids, or mixtures of these acids. Polyamides based on hexamethylenediamine

iso/terephthalamide containing high levels of terephthalic acid moiety may also be useful provided a second diamine such as 2-methyldiaminopentane is incorporated to produce a processible amorphous polymer.

The amorphous polyamide component can also include one or more semicrystalline polyamides in an amount of up to about 70 percent, and preferably about 20 to about 40 percent, based on the polyamide component. When the polyamide blend is more than about 70% semicrystalline polyamide the oxygen barrier properties and processability are reduced. Semicrystalline polyamides are the traditional semicrystalline nylons, which are generally prepared from lactams or amino acids, such as nylon 6 or nylon 11, or from condensation of diamines such as hexamethylene diamine with dibasic acids, such as succinic, adipic, or sebacic acids. Copolymers and terpolymers of these polyamides are also included, such as copolymers of hexamethylenediamine/adipic acid with caprolactam (nylon 6,66). Blends of two or more crystalline polyamides can also be used. The optional semicrystalline nylon should preferably be of a type which is miscible with the EVOH component, as evidenced by the presence of a single glass transition temperature or a depressed melting point as measured by DSC. Examples of suitable semicrystalline nylons include nylon 6, nylon 66, nylon 6,66, and copolymers of nylon 6 and 12. The polyamides of the present invention, both semicrystalline and amorphous, are prepared by condensation polymerization, which is well known to those skilled in the art.

The blends of the present invention may be prepared by blending techniques well known in the art, including the use of single or twin screw melt

processors or extruders. Blending is performed at temperatures sufficiently high to form a uniform melt of the components to be blended, typically about 200° to about 225°C.

The various layers of multiple layer sheet stock used to prepare the containers of the present invention may be held together by any of a variety of adhesive resins. In general, such adhesive resins are thermoplastic polymers having carbonyl groups derived from functional groups of free carboxylic acids, carboxylic acid salts, carboxylic acid esters, carboxylic acid amides, carboxylic anhydrides, carbonic acid esters, urethanes, ureas or the like. In these thermoplastic polymers, the carbonyl group concentration may be changed in a broad range, but in general, it is preferred to use a thermoplastic polymer containing carbonyl groups at a concentration of 10 to 1400 millimoles per 100 g of the polymer. Suitable adhesive resins include polyolefins modified with at least one ethylenically unsaturated monomer selected from unsaturated carboxylic acids and anhydrides, esters and amides thereof, especially polypropylene, high density polyethylene, low density polyethylene and ethylene-vinyl acetate copolymers modified with at least one member selected from acrylic acid, methacrylic acid, crotonic acid, fumaric acid, itaconic acid, maleic anhydride, itaconic anhydride, citraconic anhydride, ethyl acrylate, methyl methacrylate, ethyl maleate, 2-ethylhexyl acrylate, acrylamide, methacrylamide, fatty acid amides, and imides of the acids described above. The adhesive can also be prepared from an ethylene polymer and a second polymer grafted with maleic anhydride, as disclosed in U.S. Pat. 4,230,830, the disclosure of which is incorporated herein by reference. In

addition, as the adhesive resin, there can be used ethylene-acrylate copolymers, ionomers, polyalkylene oxide-polyester block copolymers, carboxymethyl cellulose derivatives, and blends of these polymers with polyolefins.

The multilayer sheet stock may be prepared by coextrusion or lamination, provided the adhesion of the layers is sufficient to be maintained after thermoforming. The coextrusion process, which is preferred, brings the multiple layers of structural, barrier, and adhesive plastics together in their molten state, preferably with uniform thickness distribution across the dimensions of the sheet. Thermoforming and trimming of the sheet as described elsewhere herein provides the containers of the present invention.

The containers thus prepared exhibit excellent barrier resistance to oxygen and other deleterious substances, and are particularly useful as inserts in food and beverage dispensing devices when prepackaging and storage of the food is desired. It is also possible, of course, to prepare containers of the present invention without any barrier layer, by forming a single layer of e.g. polyethylene, polypropylene, or other flexible structural polymer. Such containers would still have the advantage of selective, progressive collapse under suction. Although they may not be suitable for long-term storage of perishable food or beverage, they are useful as disposable inserts for infant nursers and other such dispensers.

Example

An insert is prepared of the shape shown in the figures. The insert is prepared by thermoforming and deep drawing a multiple layered sheet. The sheet,

about 1.5 - 2 mm thick, has a 0.4 mm core layer of 65 percent ethylene vinyl alcohol copolymer (30 mol percent ethylene) and 35 percent of an amorphous copolyamide of hexamethylenediamine and isophthalic and terephthalic acid moieties in a 70/30 ratio, two layers of a polypropylene-graft based adhesive, one on either side of the core layer, and two outer layers of polypropylene. The solid phase pressure forming is performed at a sheet temperature of 150°C using a Hydrotrim Labformer™ with a plug-assist and a pressure of about 450 kPa (65 psig) to provide a container with a draw ratio of about 3.2:1. The final container is about 140 mm tall, has an internal diameter tapering from about 48 mm at the top to about 40 mm at the bottom, and retains a flange of undrawn sheet stock around the upper end, extending about 4 mm radially outward. The container is filled with formula and heat sealed with a conventional metal laminate peelable lid. The container is inserted into the body of a conventional Playtex™ infant nurser, the peelable lid is removed, and the nurser is assembled as shown in Figure 3. Upon removal of the formula through the nipple by the sucking action of an infant or otherwise, the container collapses gradually, beginning at the distal end, thus permitting substantially complete removal of the formula, with a minimal ingestion of air.

CLAIMS

1. A disposable container suitable for use as an insert in a dispensing bottle, comprising a progressively collapsible body portion and a rigid annular flange at the top of the body portion extending radially outward therefrom, said body portion having a wall comprising at least one polymeric structural layer.

2. The container of claim 1 wherein the wall thickness is greatest near the flange and is thinner farther from the flange, whereby distal portion of the wall is preferentially collapsible.

3. The container of claim 2 wherein the wall further comprises at least one polymeric barrier layer.

4. The container of claim 3 wherein the barrier layer comprises an ethylene vinyl alcohol copolymer.

5. The container of claim 4 wherein the barrier layer comprises (a) about 50 to 100 percent ethylene vinyl alcohol copolymer containing about 20 to about 60 mole percent copolymerized ethylene, said copolymer having a degree of saponification of at least about 95 percent, and (b) up to about 50 weight percent of an amorphous polyamide component consisting essentially of a processible amorphous polyamide and 0 to about 70 percent semicrystalline polyamide, based on the weight of the polyamide component.

6. The container of claim 5 wherein the barrier layer comprises about 60 to about 95 percent of the ethylene vinyl alcohol copolymer and about 5 to about 40 percent of the amorphous polyamide component.

7. The container of claim 3 wherein at least two structural layers are present, one on each

side of the barrier layer, and the structural layers are polyolefin resin.

8. The container of claim 7 wherein the polyolefin is polypropylene.

9. The container of claim 6 wherein the barrier layer is about 5 to about 50 percent of the total thickness of the wall.

10. The container of claim 3 wherein the wall further comprises at least one adhesive layer.

11. The container of claim 2 wherein the flange and body of the container are integrally formed of the same material and the body is solid phase pressure formed, the wall having a total thickness of about 50 to about 700 micrometers.

12. The container of claim 2 further comprising an openable, impermeable lid sealed across the flange of the container.

13. A dispenser comprising a hollow, rigid, substantially cylindrical holder; a disposable, progressively collapsible cartridge removably supported within the holder, said cartridge comprising a rigid annular flange and a collapsible body portion, said body portion having a wall comprising at least one structural layer and being thicker nearer the flange and thinner farther from the flange; and a dispensing top in communication with the interior of the cartridge, to permit dispensing of the contents thereof.

14. The dispenser of claim 13 wherein the wall further comprises a barrier layer comprising (a) about 50 to 100 percent ethylene vinyl alcohol copolymer containing about 20 to about 60 mole percent copolymerized ethylene, said copolymer having a degree of saponification of at least about 95 percent, and (b) up to about 50 weight percent of an amorphous polyamide component.

15. The dispenser of claim 13 wherein the barrier layer comprises about 60 to about 95 percent of the ethylene vinyl alcohol copolymer and about 5 to about 40 percent of the amorphous polyamide component.

16. The dispenser of claim 14 wherein the flange and body of the cartridge are integrally formed of the same material and the body is solid phase pressure formed, the wall having a total thickness of about 50 to about 700 micrometers.

17. The dispenser of claim 13 wherein the dispensing top is a nipple.

18. The dispenser of claim 17 wherein the annular flange of the cartridge rests atop the uppermost end of the holder and the nipple rests atop the annular flange of the cartridge; said dispenser further comprising a hold-down nut which engages the upper end of the holder, whereby the cartridge and nipple are secured to the holder, avoiding leakage of the contents of the dispenser.

AMENDED CLAIMS

[received by the International Bureau on 2 October 1990 (02.10.90); original claims 1 - 4 and 14 cancelled ; claims 5, 12 and 13 amended and renumbered as claims 1, 8 and 9 ; other claims renumbered accordingly ; new claims 16 - 20 added (4 pages)]

1. A disposable container suitable for use as an insert in a food or liquid dispensing device, comprising a progressively collapsible body portion and a rigid annular flange at the top of the body portion extending radially outward therefrom, said body portion having a wall comprising at least one polymeric structural layer and at least one polymeric barrier layer which comprises

(a) about 50 to 100 percent ethylene vinyl alcohol copolymer containing about 20 to about 60 mole percent copolymerized ethylene, said copolymer having a degree of saponification of at least about 95 percent, and

(b) up to about 50 weight percent of an amorphous polyamide component consisting essentially of a processible amorphous polyamide and 0 to about 70 percent semicrystalline polyamide, based on the weight of the polyamide component;

said wall having a thickness of about 50 to about 1000 micrometers, said thickness being greater near the flange and less farther from the flange, whereby the portion of the wall farther from the flange is preferentially collapsible.

2. The container of claim 1 wherein the barrier layer comprises about 60 to about 95 percent of the ethylene vinyl alcohol copolymer and about 5 to about 40 percent of the amorphous polyamide component.

3. The container of claim 1 wherein at least two structural layers are present, one on each side of the barrier layer, and the structural layers are polyolefin resin.

4. The container of claim 3 wherein the polyolefin is polypropylene.

5. The container of claim 2 wherein the barrier layer is about 5 to about 50 percent of the total thickness of the wall.

6. The container of claim 1 wherein the wall further comprises at least one adhesive layer.

7. The container of claim 1 wherein the flange and body of the container are integrally formed of the same material and the body is solid phase pressure formed, the wall having a total thickness of about 50 to about 700 micrometers.

8. The container of claim 1 further comprising an openable, impermeable lid sealed across the flange of the container, said container containing a liquid or semiliquid food.

9. A dispenser comprising a hollow, rigid, substantially cylindrical holder; a container of claim 1 removably supported within the holder; and a dispensing top in communication with the interior of the container, to permit dispensing of the contents thereof.

10. The dispenser of claim 9 wherein the barrier layer comprises about 60 to about 95 percent of the ethylene vinyl alcohol copolymer and about 5 to about 40 percent of the amorphous polyamide component.

11. The dispenser of claim 9 wherein the flange and body of the cartridge are integrally formed of the same material and the body is solid phase pressure formed, the wall having a total thickness of about 50 to about 700 micrometers.

12. The dispenser of claim 9 wherein the dispensing top is a nipple.

13. The dispenser of claim 12 wherein the annular flange of the cartridge rests atop the uppermost end of the holder and the nipple rests atop the annular flange of the cartridge; said dispenser

further comprising a hold-down nut which engages the upper end of the holder, whereby the cartridge and nipple are secured to the holder, avoiding leakage of the contents of the dispenser.

14. The container of claim 1 further comprising a substantially planar bottom at the end of the wall distal to the rim, said bottom being substantially parallel to the plane defined by the rim.

15. The container of claim 1 wherein the thickness of the wall at the end distal to the rim is about 16 to about 38% of the thickness of the wall adjacent the rim.

16. The container of claim 15 wherein the thickness of the barrier layer at the end distal to the rim is about 16 to about 38% of the thickness of the barrier layer adjacent the rim.

17. The container of claim 1 wherein the barrier layer comprises about 20 to about 27 percent of the thickness of the wall.

18. The container of claim 1 having a depth at least about 3 times the average internal diameter.

19. The container of claim 2 wherein the barrier layer comprises about 70 to 85 percent ethylene vinyl alcohol copolymer containing about 20 to about 30 mole percent copolymerized ethylene and about 15 to about 30 weight percent of an amorphous polyamide component consisting essentially of a processible amorphous polyamide.

20. A disposable container suitable for use as an insert in a dispensing device, comprising a progressively collapsible body portion and a rigid annular flange at the top of the body portion extending radially outward therefrom, said body portion including a substantially planar bottom at the

end distal to the rim, said bottom being substantially parallel to the plane defined by the rim;

said body portion having a wall comprising at least one polymeric structural layer and at least one polymeric barrier layer comprising about 20 to about 27 percent of the thickness of the wall, said barrier layer comprising

(a) about 70 to about 85 percent ethylene vinyl alcohol copolymer containing about 20 to about 30 mole percent copolymerized ethylene, said copolymer having a degree of saponification of at least about 95 percent, and

(b) about 15 to about 30 weight percent of an amorphous polyamide component consisting essentially of a processible amorphous polyamide;

said wall having a thickness of about 50 to about 700 micrometers, the thickness of said wall and said barrier layer at the end distal to the rim each being about 16 to about 38% of the corresponding thickness adjacent the rim, whereby the portion of the wall distal to the flange is preferentially collapsible;

said container having a depth at least about 3 times the average internal diameter.

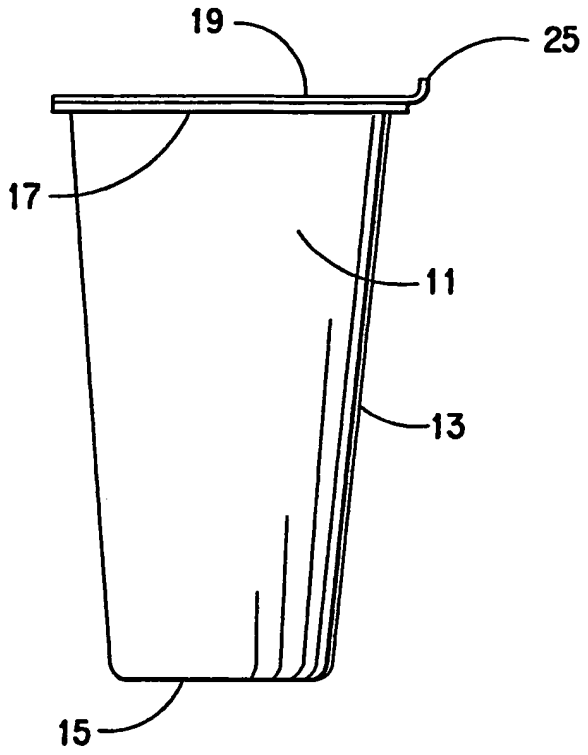

FIG. 1

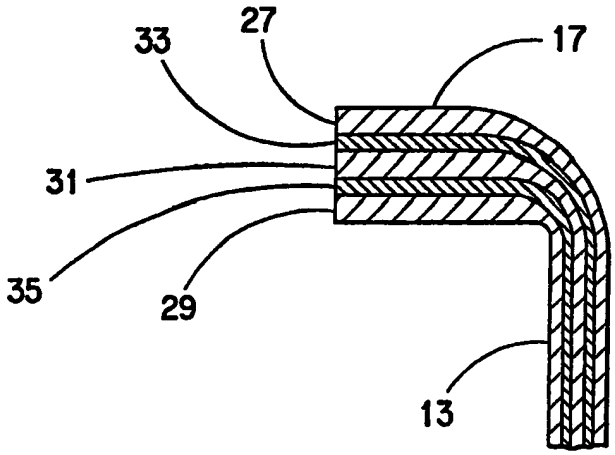

FIG. 2

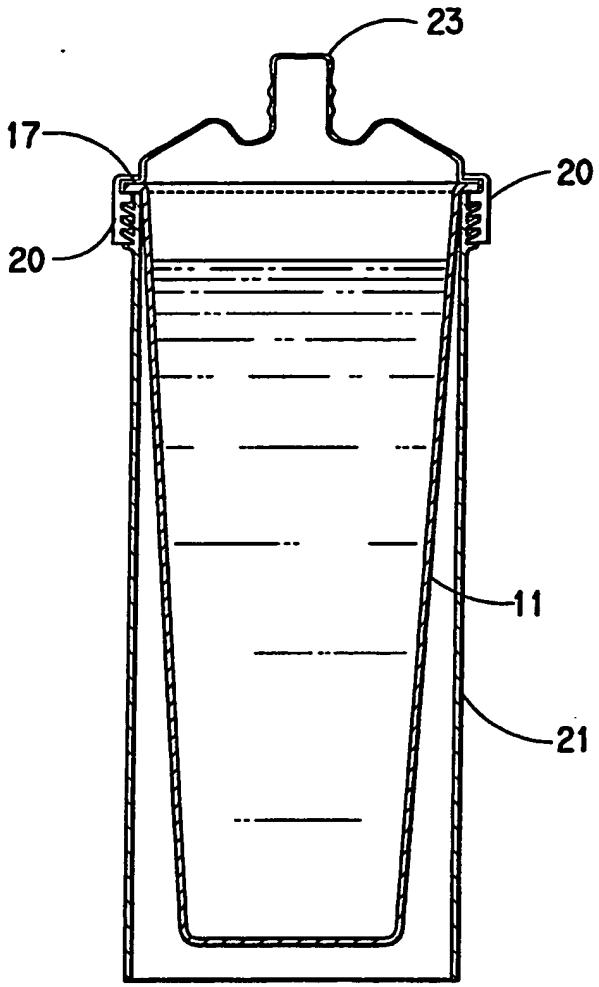

FIG.3

INTERNATIONAL SEARCH REPORT

International Application No PCT/US90/02367

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) 3

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC (5): A61J 9/00
U.S. CL.: 215/11.3

II. FIELDS SEARCHED

Minimum Documentation Searched 4

Classification System 4	Classification Symbols
U.S.	426/117, 127, 115, 124; 215/11.1, 11.2, 11.3, 11.4, 11.5, 11.6

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched 6

III. DOCUMENTS CONSIDERED TO BE RELEVANT 14

Category *	Citation of Document, 16 with indication, where appropriate, of the relevant passages 17	Relevant to Claim No. 18
X Y	US, A, 3,776,408 (WALD) 04 December 1973, See entire document.	1-2,11,13,17-18 3-10,12,14-16
Y,P	US, A, 4,869,912 (McCOY ET AL) 26 September 1989, See entire document .	3-10,12,14-16
Y	US, A, 4,706,827 (CABERNOCH ET AL) 17 November 1987, See entire document.	3-10,12,14-16
Y	US, A, 4,657,151 (CABERNOCH) 14 April 1987, See entire document	3-10,12,14-16
Y	US, A, 4,678,092 (RANE) 07 July 1987 See entire document	3-10,12,14-16
Y	US, A, 3,777,925 (ECKHOLM) 11 December 1973 See entire document	3-10,12,14-16
Y	EP, A, 0,305,146 (DEAK) 01 March 1989 See entire document	4-10,14-16

* Special categories of cited documents: 15

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search 2	Date of Mailing of this International Search Report 2
25 July 1990	31 AUG 1990
International Searching Authority 1	Signature of Authorized Officer 20
ISA/US	NGUYEN NGOC-BO INTERNATIONAL DIVISION Steven L. Weinstein

Form PCT/ISA/210 (second sheet) (May 1986)